North Cascades Resource Brief

National Park Service
U.S. Department of the Interior

North Cascades
National Park Complex

TOP:Soil profile with tephra layers
BOTTOM: Digging a soil pit near Ross Lake

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Soils

Soils are listed as one of the 12 basic inventories in the National Park Service Inventory and Monitoring Program, but rugged mountain parks present a challenge for traditional soil mapping. The Natural Resource Conservation Service (NRCS) and the National Park Service are developing new approaches to mapping soils at North Cascades (NOCA), Mount Rainier (MORA), and Olympic (OLYM) national parks. The key to this approach is linking soil formation with landforms, slopes, vegetation, hydrology, and climate. Landforms have been mapped at 1:24,000 scale and summarize data on three of five main soils forming factors: time, relief vand parent material.

Combined with other GIS data, a soils model is produced that is field verified and linked to soil types found adjacent to the parks, while in some cases, new soil series are named. For NOCA, 42 new soils series were created with local names such as Despair, Torment and Manly Wham. Thvese soil maps will help resource managers in the parks identify habitat, geologic hazards, vegetation communities and long term ecological monitoring sites, as well as assist with management of cultural resources and restoration of disturbed sites.

Status and Trends

The current status and trends in soil character and quality are not well understood in the North Coast and Cascades Network (NCCN). Current plans call for soil temperature and moisture monitoring at several NRCS SNOTEL (snowpack telemetry) sites at the three parks, while the soil inventory provides a baseline to assess other potential changes. What we know so far is that the dominant soil orders found within NOCA include Andisols, Inceptisols, Entisols, Spodosols and to a far lesser extent Histosols. Soils mapping at San Juan Island, Ebey's Landing, and NOCA is complete, with mapping at MORA planned for 2011-2013, vfollowed by OLYM. The soil survey, soil descriptions, and corresponding GIS data for NOCA is posted online at the NRCS website (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).

Discussion

Soil classification within NOCA is largely determined by the presence or absence of volcanic ash. Andisols have a thick (>36 cm) mantle of material dominated by volcanic ash; at least eight separate ash layers have been identified in the park. These tephra layers are especially well-preserved on mountain passes were ash accumulated undisturbed. Inceptisols have either a thin mantle (< 36 cm) of volcanic tephra influenced material or highly mixed volcanic tephra and glacial drift throughout the soil profile. Entisols within NOCA are distinguishable by the absence of volcanic tephra within the soil profile. Spodosols require a lot of time to develop and are found on the oldest landforms in the park, like Pleistocene moraines, where conifer needles create acidic soils conditions. Histosols are typically found in wet areas that preserve organic matter within the soil profile, and are associated with habitat for amphibians. Soil types can tell a story of formation processes and indicate major events such as glacial transport, fire, inundation, or volcanic eruptions. This data can help to date events in the distant past and provide evidence of paleoenvironments as well as human influences.